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ABSTRACT

Almost 180 (22.5 percent) of BP Chemicals/HITCO, Inc. (BPCHI) employees have participated in the basic skills courses offered through the Competitive Skills Project (CSP) at El Camino College (Torrance, California). Workplace basics provide a solid foundation for Total Quality Management (TQM), enabling workers to be globally competitive. Two main groups were targeted for training: shop floor, maintenance, inspection, and technical service workers; and higher skill classification workers. Curriculum design was based on a workplace needs assessment. Assessment analysis identified three basic skills/literacy deficiencies: language, numerical, and basic computer. To address the need, three core courses were developed: communication/English skills for quality; TQM for limited English proficient workers; and English as a Second Language for TQM. In addition, a math skills course was developed. The project consisted of six cycles of courses, an onsite computer lab, and a volunteer tutoring program. Workshops were held to train tutors and supervisors and to improve the computer literacy and report writing skills of participants. The following conclusions about the CSP were reached: (1) consistency of project staff and business partners is critical to effectiveness; (2) line supervisors were a significant barrier to worker participation; and (3) formulation of customized curricula is an ongoing process requiring continual modification. (The bulk of this document contains four appendices: final report of the HITCO Basic Skills Audit; ESL for TQM curriculum; schedule of courses offered; and BPCHI Mission Statement.) (NLA)

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EL CAMINO COLLEGE

COMPETITVE SKILLS PROJECT
FINAL REPORT

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An educational partnership between El Camino College and BP Chemicals/HITCO Inc. to institute a basic skills training project in the workplace funded in part by the U.S. Department of Education.

Award # V198A00076

July 1992

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COMPETITIVE SKILLS PROJECT
FINAL REPORT
EL CAMINO COLLEGE

Since the inception of the Competitive Skills Project at BP Chemicals/HITCO Inc. (BPCHI), close to 180 (22.5%) of the employees have taken part in the basic skills courses offered through the Department of Education's workplace literacy partnership.

The touchstone for all instruction provided in the Competitive Skills Project (CSP) was the drive to implement quality principles and technological innovation to remain/become globally competitive. To survive, companies must do business differently and work smarter. While knowledge of specific job tasks is important, it is equally important that workers can keep up with the changing nature of their jobs. A solid foundation in workplace basics (the ability to read instructions and manuals, communicate in team meetings, and chart processes are but a few examples) is the key to Total Quality Management.

Total Quality Management stresses the importance of input from all involved in any process as those involved are likely to know better than anyone else where troubles lie in the process. This input is both written and verbal and where the workforce is made up of many workers with limited English proficiency, as it is at BPCHI, the worker's ability to participate is seriously hampered.

In its design for a project that would provide basic skills training to the BPCHI workforce, the El Camino College workplace literacy program followed the basici philosophy of the National Literacy Act of 1991 and the National Workplace Literacy Program recently articulated in their publication Workplace Literacy: Reshaping the American Workforce:

- improve the basic skills of employees
- improve employee performance
- develop model curricula
- institutionalize program and replicate at new sites

Background/Overview

In early 1989 BP CHEMICALS/HITCO INC. (BPCHI) entered into an educational partnership with El Camino College, Torrance, California to improve the education level of its workforce.

In an attempt to sustain competitiveness in a global market, a corporate strategy of Continuous Measurable Improvement (Total Quality Management) was pursued to achieve BPCHI's goal of becoming "the long-term supplier of choice within the composites industry."

BP Chemicals/HITCO Inc. is a composites manufacturer making both defense and commercial applications. The company is a medium size employer with approximately 670 workers located in Gardena, California. It is an important supplier to the aerospace companies located in the Los Angeles area. Typical products include radar domes for aircraft, wiring insulation, jet fighter brakes, and race car brakes. Hard hit by defense budget cuttbacks and the recession, the company has been rocked by layoffs in recent years. When the project began in late 1990, the employee population was over 800.

In its initial relationship with El Camino College, courses from the college catalog were taught at the BPCHI worksite. The workers served were primarily BPCHI's mid and upper salary level employees. However, BPCHI soon recognized a need to address the educational needs of all of its workers so that TQM principles could be implemented with measurable success throughout the organization. Located in an economically less affluent section of the greater Los Angeles area with a culturally diverse workforce comprised of many workers with low literacy skills, BPCHI welcomed the opportunity to enhance their existing partnership with El Camino College by implementing a basic skills training program.

In July of 1990, the partnership received a grant award totaling $241,133 from the U.S. Department of Education's National Workplace Literacy program to establish a pilot project spanning 20 months. This amount was supplemented by matching funds from El Camino College and BPCHI. Originally called the Competitive Basic Skills Project, the word "Basic" was dropped because of its perceived remedial connotation and the project became known simply as the Competitive Skills Project (CSP).

Plan of Management

The plan of management for the project stipulated that BPCHI would be responsible for:

1. Providing training facilities
2. Providing access to the plant and cooperation in a

4. Providing release time for employees

It was the responsibility of El Camino College to:

1. Manage the project
2. Provide instruction on the company site
3. Conduct the literacy audit
4. Adapt college reading, writing and math classes to company needs
5. Contract for the evaluation of the project

Target Group

At the outset, BPCHI estimated that 561 of their workers were in need of literacy and basic skills training. 67.2% are male (72.2% minority); 32% female (89.3% minority). The group showed bimodal characteristics in age and educational levels. Among minority workers, 75% were thought to be non-native speakers of English with half of this group having limited English proficiency in oral English and English literacy. Two main groups were targeted for training:

a. Workers on the shop floor, in maintenance, and in inspection and technical services who need to (1) develop their skills in order to be more productive at their present jobs, (2) learn additional skills to be prepared for the technological changes the company is implementing, and (3) acquire higher levels of literacy so that they can be promoted.

b. Workers in higher skilled classifications, such as tape wrappers, machinists, nozzle assemblers and plastic specialists who need more advanced literacy training along with skills training in math and blueprint reading.

Needs Assessment

The design of the Competitive Skills Project curriculum for context-based basic skills training relied heavily on the results of a needs assessment conducted at the worksite.

A needs assessment of the target groups was conducted through interviews, task analyses, and a literacy audit of the materials (e.g. manufacturing orders, directions, safety instructions, company memos, etc.) that employees were expected to understand.

Management and worker's perceptions of what training was needed or desirable was also articulated through sessions with the project counselor and by questionnaire. Personal goals and literacy needs were probed using the same means of inquiry.

The needs assessment confirmed earlier estimates of a pervasive need for English as a second language training along with basic reading and math skills instruction. The literacy audit revealed that some materials that employees were being asked to comprehend were of a very technical nature. The audit also revealed a heavy reliance on oral communication between the supervisor/lead person and the worker. For a report on the outcome of the literacy audit with lists of the types of information encountered, please see Appendix A.

Analysis of the needs assessment identified the following basic skills/literacy deficiencies:

1. Language Based Literacy

   - understanding structure and content of instructions reading and interpreting work orders, manufacturing orders and following specifications accurately
   - following directions on how to operate complex machinery and equipment such as high volume numeric control equipment while monitoring and verifying accuracy of work done
   - recognizing form and function of particular materials, e.g. work orders, time sheets, scheduling tables, statistic based graphs and charts; flow charts; specification tables.
   - recognizing work related vocabulary terms that appear in instructions and manufacturing orders and the technical terms used in quality improvement processes

2. Numerical Literacy

   - understanding specifications
   - using tools required for accurate measuring such as calculators, calipers, micrometers, tape measure

- understanding and implementing statistical techniques required for quality monitoring and improvement
- understanding graphic or statistically oriented information, interpreting graphs and charts

3. Basic Computer Literacy

- understanding and interfacing with computer programs
- inputing basic information and following a preset menu based program

Curriculum

While technical instruction needs of the higher skilled employees were being served by the El Camino College catalog courses taught at the BPCHI worksite, there was no existing curriculum to introduce the limited English proficiency workers to TQM principles and procedures while improving their basic English skills.

To address this need three innovative core courses were specifically developed to instruct workers in context-based basic English skills that incorporated TQM principles and vocabulary.

- Communication / English Skills for Quality
  Instructor: Dawna Davis

This course was designed to meet the specific reading and writing needs of BPCHI employees. Materials collected from the facility were used as instructional aides.

Subjects covered included:

- Reading
- Writing
- Grammar
- Communication Skills

Emphasis in this introductory course was to familiarize employees with the basics of effective communication techniques and introduce them to TQM principles of communication.

- Total Quality Management for Limited English Proficient

Instructor: Dawna Davis

This course was of an introductory nature designed to enable employees with limited English proficiency to gain the conversational English skills they need to make contributions to quality improvement in the workplace while they learn the underlying content of quality principles.

Topics that were covered included:

- Process/Continuous Process Improvement
- Customer Focus
- Teamwork/Group Process Development/Meeting Skills
- Conflict Resolution Strategies
- Communication Techniques
- Prevention vs. Inspection

The class was structured with small and large group activities emphasizing opportunities for learners to practice principles which were being taught and the English language skills that go along with those principles. The intent was to model the behaviors and the language practiced in a quality atmosphere. Flexibility was maintained in the structure to modify and customize course content to context based issues and concerns.

- ESL FOR TQM
  Instructor: Joan Apodaca

This course was developed to build on the skills and principles introduced in the TQM for Limited English Proficient class. The day-to-day teaching role modeled the skills needed to participate effectively as a work team. Each class consisted of:

1. A posted agenda and review of the last class
2. Times allotted for each agenda item with a timekeeper appointed to announce when items run over
3. Group decision making about class priorities
4. Wherever possible work was done in groups or at least pairs to promote cooperation

A greater emphasis was placed on teaching basic English grammar and writing skills than in the earlier class. It is an important element of the TQM process that a worker can produce a written description to communicate a process or a

problem. Identifying the elements of sentence structure, syntax, and spelling were covered within the framework of a Total Quality Management Team. At the end of each class the instructor distributed a "Customer Satisfaction Evaluation Form" for the participants to provide feedback to the instructor about what was most helpful in the day's lesson plan. The evaluation form was helpful in keeping the instructor informed and flexible to the participant's needs.

In addition to these courses designed to increase language skills, a math course was developed to teach numeracy basics with an emphasis on the uses of technology in a TQM environment.

- Math Skills for Quality
  Instructor: Myrna Manley

  This class was designed to combine basic math skills with an emphasis on technology. Using the text Calculator Power by Robert Mitchell as a base, the participants learned to use a calculator to solve math problems. The course was designed to give an understanding of math as a way of going into the basics of problem solving. The traditional emphasis on computations can become repetitious and does not necessarily demonstrate when to perform a particular function to solve a stated problem. Instruction was given in the basic math skills of when to multiply and divide and how to perform these functions on a calculator. Particular focus of the class was to learn from participants what they needed to know and do on their particular job.

Outlines for the curricula of these core courses appear in Appendix B.

Participant Recruitment/Placement

Participation of the employees at BPCHI in the project was voluntary. Recruitment was done through announcements on bulletin boards, department meetings, interviews with supervisors, and through the informal "word of mouth" information system that is so important in less literate populations. Because of the voluntary nature of the project, placement procedures varied from pre-tests to oral interviews and a wide range of educational level was common in the basic skills classes and class size fluctuated as attendance was not mandatory.

Individualized Education Plan

The project hired an educational counselor to serve as a resource person for employees to set up individualized education plans. Employees of the basic skills group received guidance on goal-setting. Each employee assessed his or her strengths and weaknesses, then identified academic areas to be improved. From this foundation, goals were set for work and personal life, and a course of action was planned. Problem areas and possible barriers to achievement were also identified.

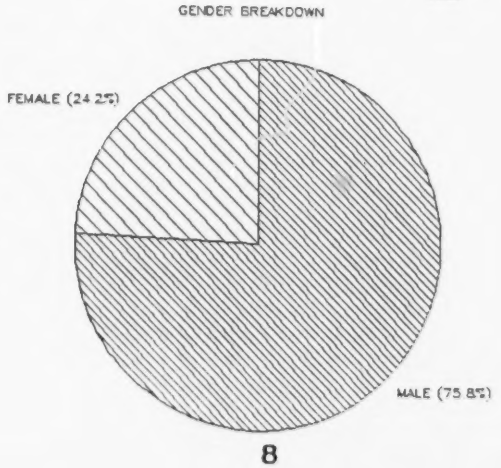
Delivery System

Because of a delay in the hiring of a project coordinator the project consisted of six training cycles rather than the proposed seven. For a schedule of classes offered under the project, please see Appendix C.

Numbers Served

Attendance records of classes conducted document that over 180 employees participated in the Competitive Skills Project. Because of the open-entry open-exit enrollment system, and as a result of layoffs during the span of the project, 120 employees completed the basic skills/ TQM training and workshops offered. 22 of those employees took more than one course. A table listing the courses offered and the numbers of employees who participated appears in the GOALS/OBJECTIVES section of this report.

The number of male participants was 91 while there were 29 female participants (Figure 1).



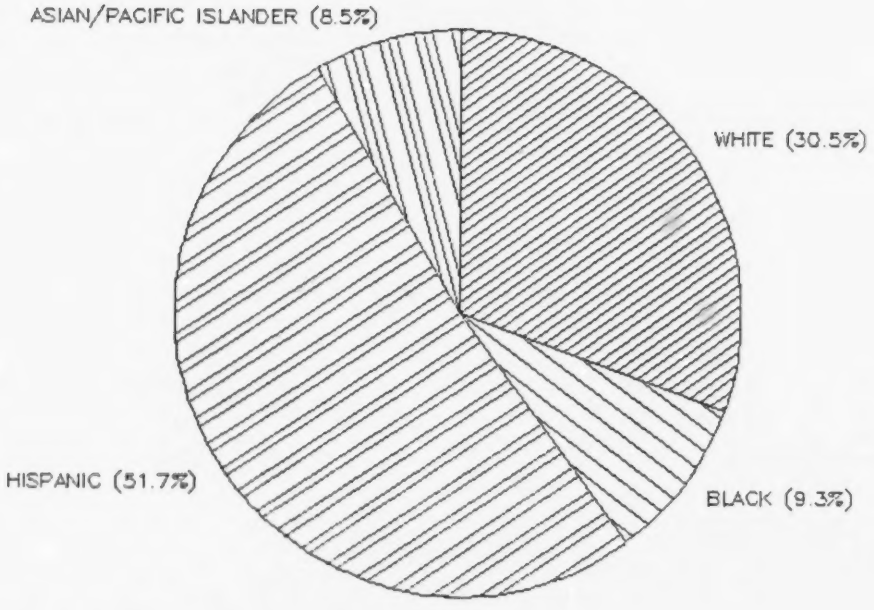
The following is a demographic breakdown of participants served by race/ethnicity:

Ethnic Group	No.s Served
White	36
Black	11
Hispanic	61
Asian/ Pacific Islander	10

(Figure 2)

CSP PROJECT

ETHNIC BREAKDOWN



The number of Limited English Proficient employees participating was 41.

GOALS/OBJECTIVES

The following is a an outline of the original goals and objectives in the project proposal and an account of how those goals and objectives were met.

GOAL ONE: ASSESS WORKPLACE LITERACY NEEDS

Objective 1.1: Conduct literacy audit of targeted jobs.

A literacy audit was conducted by questionnaire and interview throughout the BPCHI facility over a two week period during November 1990. The audit asked employees what they were reading, writing, and what mathematics problems they were encountering at work. Problem solving, and oral communication functions in the workplace were also queried as well as what type of training services the employees themselves would like to have offered. A randomly selected sample of employees were interviewed. The employees ranged from shop employees in the insulation department to plant protection representatives and administrative aides. Management personnel were also interviewed as part of this process.

Objective 1.2: Analyze content information and difficulty levels

The audit established that all the literacy functions covered in the questionnaire were present in varying levels of difficulty in all of the tasks sampled. The audit found that the workers were being asked to do some very technical reading in the form of work orders, manufacturing orders, regulations, job specifications, safety information, directions, charts, graphs, gauges, and company communications. The audit also indicated that some workers relied heavily on oral communication from fellow workers/lead people when they were unable to understand or read the materials. The courses that were developed for the project incorporated the findings of the literacy audit.

Objective 1.3: Conduct preliminary analysis of language proficiency, literacy levels, and educational background of individual workers.

A study of the personnel files of the company revealed that the educational background of the participants of the courses ranged from those who had not completed grammar school to U.S. High

School graduates. There are also some members of the workforce who are graduates of colleges from other countries.

GOAL TWO: DEVELOP PROGRAM

Objective 2.1: Develop Program Components

The project program consisted of three main components:

- Six Cycles of Courses
- On-site computer lab
- Volunteer Tutoring Program

Objective 2.2: Develop course curricula

* Vocational English as a Second Language (Dawna Davis)
* Advanced English as a Second Language (Joan Apodaca)
* Math Skills for Quality (Myrna Manley)

Vocational English as a Second Language for TQM (VESL-TQM)

This class was developed and customized around manufacturing terminologies and TQM principles for employees whose primary language isn't English, but who would like to get a more in-depth understanding of the manufacturing environment while improving their skills in speaking and comprehending English.

English as a Second Language for Quality (AESL)

This course was developed for employees whose primary language isn't English, but have a basic vocabulary in the English language. This was a more advanced course that worked on pronunciation, reading and writing of English.

Math For Quality

This course was designed to meet the specific numeracy needs of BPCHI employees. Materials collected from the Gardena facility were used as instructional aides to make the course more specific to the company and employee needs. Subjects covered included: graphs, charts, gauges, fractions/decimals, and calculators.

Communication / English Skills for Quality

This course was designed to meet the specific reading and writing needs of BPCHI employees. Materials collected from the facility were used as examples. Emphasis was on language skills that promoted problem solving and group dynamics as well as presentation skills. Subjects covered include: reading, writing, grammar, and communication skills.

Objective 2.3: Develop content for computer lab

Three (3) IBM Personal Computers and adequate software packages were purchased and a learning lab was established at the worksite. The following is a list of the software packages that were bought.

Software	Description
TEAM	Adult Education (Vocabulary and Reading for "At Risk" Populations)
GOAL	Adult Education (Vocabulary and Reading Life Skills Training)
GRAMMATIK	Grammar Package
SPEED READER	Reading Package

OTHER LAB AIDES:

FRANKLIN LANGUAGE MASTERS
IN ENGLISH : An ESL Video Instructional Program

Customized software was also developed using Authorware, a sophisticated computer authoring tool for developing instructional programs with audio and animation. The emphasis of the tutorial developed with this software is on the basic principles and philosophies of TQM. This includes an introduction to TQM as well as assignments that teach the basics of charts and graphs. BPCHI is currently using the program developed as a tool for orientation of new hires to the company philosophy of Continuous Process Improvement/TQM. (Appendix D)

Objective 2.4: Develop curriculum for workshop sessions

The following workshops were offered as part of this Project:

* Tutor Training
* Supervisor training on workplace literacy
* Computer skills training
* Report Writing

Tutor Training Workshop

This course included 20 hours of instruction over a four day period. Participants were members of the workforce who were interested in helping the basic skills participants of the program. Low level learners were paired with literacy tutors for one-on-one instruction.

Supervisor Training on workplace literacy

A two and one-half hour program was designed to familiarize supervisors and managers with various ways in which they can assist in the development and advancement of their employees. Its purpose was to help supervisors gain an awareness of basic skill/literacy demands on the job and to provide them with some skills and techniques for dealing with any deficiencies that become apparent. The workshop was held in January 1991 after it was noted in an advisory committee meeting that there was a lack of cooperation on the part of some supervisors to release workers to attend classes.

Computer Literacy Workshop

This workshop was designed for employees who have had little or no exposure to computers. Basic skills participants received personalized instruction and hands-on practice in utilizing the educational software programs to reinforce learning tailored from their classes. Also covered in the workshop were the basics of accessing and using the software which is widely used throughout the company.

Report Writing Workshop

This workshop was designed to teach participants how to communicate in writing more effectively. Emphasis was placed on outlining and organization of materials for reports and the effective written transmission of work related problems e.g. machine malfunctions, supply shortages, employee suggestions or complaints.

GOAL THREE: DEVELOP PROGRAM ORIENTATION FOR WORKERS

Objective 3.1: Disseminate information to the workforce

Dissemination about the project was conducted through various means. A published schedule of classes was distributed to all departments, flyers and announcements were posted on employee bulletin boards, and announcements were made in department meetings.

Objective 3.2: Produce promotional video

Because of organizational and scheduling difficulties, this video was never produced. However, the CSP project is featured in a video that was developed by the California Community Colleges Chancellors office on workplace literacy and can be used in the future to promote this program to the workforce as well as to other corporations that might be interested in learning about this pilot program. (Contact Chancellors Office for set of videocassettes.)

Objective 3.3: Conduct orientation session and placement for 300 employees

Orientation for the employees was conducted by department and supervisors were interviewed concerning placement of employees who exhibited a need for basic skills training. All employees were made aware that the courses offered were due to the funding of the Department of Education grant.

Objective 4.1: Conduct staff pre-service training session for faculty and staff

Instructors for the project were selected because of their innovative approach to teaching. An emphasis on teamwork and participative classroom instruction (as opposed to lectures) was the focus of the staff development. The staff was also made

aware of the goals of the project. Every member of the team was given a plant tour of BPCHI to familiarize them with the company culture/environment. Reading materials were also made available to all instructors as reference guides describing the company philosophy and corporate goals.

Objective 5.1: Conduct seven training cycles providing instruction to 175 workers; retain 140 through completion of class and move 50 of those to the next level.

Because of a delay in hiring of a project coordinator, the project got off to a late start. As a result, six training sessions were conducted during the 20 month span of the project. Attendance records document 121 workers completing the basic skills courses developed specifically for the project. 22 of these participants took more than one course and are therefore counted twice.

CLASS	# OF EMPLOYEES	HOURS	MAN HOURS
VESL TQM(2)	24	40	960
ESL F/QUALITY	17	40	680
MATH F/QUALITY	23	48	1104
COMM/ENG FOR QUALITY	6	48	288
REPORT WRITING WORKSHOP	18	12	216
TUTOR TRAINING WORKSHOP	6	20	120
PC LITERACY WORKSHOP	27	12	324
TOTALS	**121**	**220**	**3692**

GOAL SIX: TEACH PARTICIPANTS TO DEVELOP COMPETITIVE BASIC SKILLS FOR WORKPLACE LITERACY

Objective 6.1: Increase workplace literacy performance as measured by increased test scores, levels of workplace literacy participation and feedback from supervisors.

Methods of evaluation varied depending on the course offered. Some courses relied on oral interviews and participant evaluation forms while others relied on standardized and teacher made tests. In those classes where ETS Test of Applied Literacy Skills was given to participants at the outset of the classes and upon completion of course work, the final reports of the instructors indicate that evidence of significant improvement was negligible as curriculum for classes addressed workplace needs. Interviews with supervisors, however, did indicate an improvement in overall performance and attitude of employees.

GOAL SEVEN: INSTITUTIONALIZE THE PROGRAM

Objective 7.1: The college will incorporate the introductory class into the college curriculum

An introductory course in reading, mathematics, and computer literacy in a workplace context is being developed based on the knowledge and experience gained as a result of this pilot project. The course design will be presented to the college curriculum committee. However, the college cannot assure that the committee will accept the course.

Objective 7.2: The company will provide ongoing training for its employees through partnerships with El Camino and other educational agencies

BPCHI supports training to its employees by offering courses through El Camino, British Petroleum, American Society for Quality Control and other educational agencies. Some other courses offered include: TQM Training, CQE Refresher Courses, Computer Training, Supervision Courses, etc. The company has also advertised its "Tuition Reimbursement Program" and employees who have participated in the on-site courses have gone on to take classes at area colleges and universities.

GOAL EIGHT: DISSEMINATE THE RESULTS

Objective 8.1: The college will make conference presentations on project

CALIFORNIA VOCATIONAL EDUCATIONAL CONFERENCE	-	(5/9-11/9
USC LITERACY CONFERENCE	-	(6/8/91)
ACCESSING TECHNOLOGY FOR ADULT LITERACY	-	(7/17-20/
CALIFORNIA: THE STATE OF LITERACY CONFERENCE	-	(9/4/91)
CALIFORNIA LITERACY CONFERENCE	-	(9/26-28/

AMERICAN SOCIETY FOR TRAINING & DEVELOPMENT	-	(10/10/91
Q-FEST '91 - COMMUNITY ALLIANCE FOR TOTAL QUALITY	-	(10/15/91
AREA REGIONAL CATESOL CONFERENCE	-	(11/2/91)
WORKFORCE 2000: A LITERATE WORKFORCE	-	(11/13/91
HR 2000 - RETURN ON VISION	-	(2/2/92)
INTERNATIONAL TESL CONFERENCE	-	(3/1-7/92
EL CAMINO COLLEGE FLEX DAY	-	(3/12/92)

Objective 8.2: The company will publicize efforts among other employers

AMERICAN SOCIETY FOR TRAINING & DEVELOPMENT	-	(10/10/91
Q-FEST '91 - COMMUNITY ALLIANCE FOR TOTAL QUALITY	-	(10/15/91
AREA REGIONAL CATESOL CONFERENCE	-	(11/2/91)

The company has participated in recruiting efforts to other industry suppliers in the area with success. Hughes Aircraft Electronics Dynamics Division has entered into an educational partnership with El Camino on workplace literacy as a direct result of the pilot program at BP Chemicals.

EVALUATION

Project Pitfalls

In any project of this scope, unforseen difficulties arise which frustrate the completion of goals and the attainment of proposed outcomes; the Competitive Skills Project is no exception. Below are listed some of the difficulties encountered in the course of the project and the negative effect these difficulties had on the project are noted.

1. Delayed hiring of key personnel:
   The Project start date was 6/18/90, but due to complications in the college hiring process, the Project coordinator, Georganna Ahlfors, was not hired until 10/23/90 and the company liaison did not begin until that time. The Project's clerical assistant did not begin work until January of 1991. This delay necessitated a request for an extension of the Project which was granted by the U.S. Department of Education.

2. Loss of Project Director:

   The Project Director, Nick Kremer, left El Camino College during the course of the project. As Mr. Kremer was the

primary proposal writer and planner for the Project, the continuity of the Project was adversely affected by his departure.

3. Loss of Project Coordinator

   Dr. Ahlfors' contract was not renewed at the end of 1991. Ms. Kathy Lane came on board in January of 1992 to coordinate project activities through the extension period of the grant which ended in April 1992.

4. Business set-backs for partner:

   Because of the recession and accompanying slowdown in the aerospace industry, BPCHI had numerous layoffs of their staff during the span of the project. Since the situation lead to uncertainty throughout the company and affected the workers who would ordinarily be in the Project classes, class attendance was well below original projections (i.e. 180 to 120).

The negative result of the unsettled nature of the project management was the tracking of project participant progress. While regular quarterly advisory committee meetings were held at the beginning of the project to evaluate problems and procedures, these meetings dwindled as the uncertainty of project management increased. While the overall effects of the recession on participation in the project can only be speculated on, interviews with company personnel and feedback gained from the final advisory committee meetings indicate a growing reluctance of supervisors to release employees to attend project courses as confidence in job stability was undermined by the poor economic situation.

Evaluation Methods

An outside evaluator, Heide Spruck Wrigley, was contracted to evaluate the project and its effects on the participants and BPCHI. The report of the outside evaluator will be submitted to the U.S. Department of Education.

For its inside evaluation, El Camino College considered pre and post participant test scores, the final reports of instructors and the project counselor along with feedback from company personnel. Overall, these reports were encouraging. Participant motivation to learning basic skills, especially language skills

for the Limited English Proficient employee, was very high. In follow-up interviews with the project counselor, the most common improvement area mentioned was English, specifically composition and oral communication. In these interviews, virtually all the participants indicated that they had made progress and many were continuing to actively pursue English proficiency goals. Although many employees acknowledged they needed to improve their math skills, there was a certain anxiety about this subject area. The relationship between math and work or daily tasks was also not always apparent to the employees.

Company representatives on the project advisory committee indicated that while the classes seemed somewhat fast paced, they were impressed with the beneficial effects of the project on employee attitude and performance.

CONCLUSION

The Competitive Skills Project was an excellent learning experience for both the educational and business partners. Although significant challenges to success arose along the way and the economic situation undermined the project's impact, substantial progress was made by both the employee participants and the partners involved.

Consistency of project staff and business partners committed to the project is critical for establishing and maintaining the corporate liaison relationship; the project flow and overall administration and effective execution of the program goals and objectives is dependent on consistent direction. There is therefore no doubt that the effectiveness of the project was undermined by all the changes in the CSP leadership.

Line supervisors were a significant barrier to the CSP. Although an attempt was made to bring the supervisors into the program through the supervisors workshop (21 supervisors attended), reports from instructors and the project counselor as well as minutes from the advisory committee meetings indicate that the line supervisors were a negative influence. Besides severely restricting the number of employees released to take classes offered by the project, employees initial enthusiasm for TQM was deflated by supervisors who did not respond to employee suggestions and input.

Formulation of customized curricula is an on-going process requiring continual modification to meet changes within the highly competitive aerospace manufacturing environment. Open entry - Open Exit creates significant fluctuation in class make-up and it is exceedingly difficult for employees to "catch up" on missed class time. The voluntary nature of project participation made curriculum planning difficult as well as the placement of employees and the tracking of participant progress.

The foundation for a customized curricula has been developed within the context of the Competitive Skills Project. Additional study and development is needed before this contextual based curricula will be transferrable to other manufacturing organizations.

RECOMMENDATIONS

The CSP has provided a solid foundation for continuation and expansion. In the future it is recommended that:

1. Instructors participate in an in-service that provides hands-on training in adult literacy, Total Quality Management concepts and practices and the challenges and rewards of teaching basic skills in the workplace prior to selection. Periodic workshops should also be held throughout the duration of the project.

2. Front line supervisors, since they continue to represent a major barrier to employee participation should be encouraged to take an active role in the project through the advisory committee and by assisting instructors by bringing examples of actual work problems to the classes for participants to problem-solve.

3. Customized curricula be developed for all basic skills classes

4. Evaluation methods be implemented at the start of the project with a database customized to collect data on a consistent basis. Data to be evaluated during and at the end of each set of classes.

5. Have increased employee participation on the advisory committee.

6. Develop computer based instructional design to support curricula and provide employees with ongoing lab opportunities to reinforce learning and develop skill levels.

7. Develop and maintain a confidential database for tracking each participant's progress and provide additional help as indicated.

8. Maintain continuous liaison and dialogue with partners as to status and progress of the project and participants in addition to advisory meetings.

APPENDIX A

FINAL REPORT

HITCO BASIC SKILLS AUDIT

DECEMBER 10, 1990

An audit of the basic skills used by the workers at BP Chemicals-Hitco was conducted from November 26, 1990, through December 5,1990. In the course of the audit, employees from all areas of the company were interviewed including manufacturing, clerical, maintenance, shipping and receiving, and security.

Each of the workers was asked the following questions:

- What is your job title?
- What things do you read for your work?
- What kind of writing do you do for your work?
- What computation/mathematical skills do you use in your work?
- What oral communication do you do in your job (both listening and speaking)?
- What problem solving do you do in your job?
- Which of the courses offered at HITCO have you already taken?
- What other courses would you like to see offered?
- What needs have you observed for courses to be offered?

The results of the survey show that the employees at all levels do a great deal of reading, writing, computation, and oral communication. They also see a need to improve their skills in these areas with a strong emphasis on improvement of oral communication skills (primarily English language skills) and written skills.

What Are They Reading?

- manufacturing orders (MO)
- vocabulary (specialized)
- charts
- graphs
- gauges
- production reports
- memos (from supervisors; engineers)
- blueprints
- instructions (parts, tools)
- material safety data sheets (msds)
- directions (use of products; mixtures)

job specifications
templates
manufacturing process standards (MPS)
quality assurance instructions (QAI)
working schedules
configurations
production planning schedules
warnings

Clerical

memos
instructions
manuals
policies and procedures

---

work orders
directions
technical manuals
maps

---

shipping labels
packing slips
trade bills
memos
IATA Regulations
hazardous material shipping procedures
Schedule B shipping and export manuals
motor freight classifications
instructions
purchase orders
change orders
PMS Instructions (how to package materials)
certifications

---

security manuals
bulletins
post orders
general orders
memos
access controls
safety / health manuals

What Are They Writing?

manufacturing / production reports
comments (in-process defect charts)
reports (end of day)

material status reports
inventory list (self-devised form)
work report (job card)
non-conformance reports (NCR) - rejected parts
speed memos
notes (for next person/shift)
numbers (status reports)
response to work orders

---

edit newsletter
letters
forms
rewrites
memos
messages

---

forms
declarations of hazardous materials shipping
export paperwork
secret part shipping reports
bill of lading
discrepancy notices
log books
information on receivers

---

incident reports
citations
desklog
safety violations
memos

What Computations Do They Do?

time cards (add hours)
acid concentrations (percentages; tables; gauges)
measurements - linear
gauges (differences)
depth
compare numbers
ratios
rates
calipers
go / no go gauges
thermometers
averages
micrometer (subtraction and averages)

tapes and rulers
reducing fractions
changing fractions to feet and inches
decimals
attendance records
charts

---

units of measurement
- cubic measurement
- dimensions
- yards
- pounds

conversions
estimating property and vehicle damage

What Oral Communication Do They Do?

LISTENING
directions and instructions from supervisors
explanations and inquiries from engineers
changes
teamwork (ex. welder and fitter)

---

messages
requests
verbal instructions
orders

SPEAKING
directions
problems w/parts to lead or engineer
specifications
questions from engineers
explanation of procedures and processes
team communication

---

phone skills
supervisor approvals
discrepancies

What Problem Solving Do They Do?

tolerance on measurements
reacting to problems
corrections based on gauges and tests
comparing directions
decision to call inspector or lead

whether to use parts
assign work
when something doesn't "feel right"
determine if specs are met
---
where something belongs
departmental follow-up
referrals
cross referencing

DESIRED CLASSES

ESL (3 levels)
- oral communication
- writing
- reading
- pronunciation

computer
writing
career development
public speaking
spelling
blueprint reading
supervision
GED
reading gauges and charts
grammar
advanced math (algebra, geometry, trigonometry, calculus)
statistics
business writing
phone skills
basic psychology
on-the-job writing
presentations
fire safety
interpersonal skills
simplified writing (writing for your audience)
training skills
motivation / self esteem

HITCO WORKPLACE LITERACY AUDIT

DEPARTMENT_____JOB_____

SKILLS OBSERVED:

_____ READING

_____ WRITING

_____ COMPUTATION

_____ LISTENING

_____ ORAL COMMUNICATION

_____ PROBLEM SOLVING

What would you like to see offered?

What are the needs you observe?

What are your goals?

LITERACY AUDIT--INTERVIEW

1. What are your job responsibilities?

2. What tools do you use? What machines do you operate?

3. Who do you have to talk to at work?
   Do you ask questions
   tell people things
   get instructions

4. What do you have to read?
   MOs
   labels
   instructions
   memos
   charts
   graphs
   abbreviations

5. Do you do any measuring?
   addition and subtraction
   multiplication
   division
   fractions
   decimals

6. What do you have to write?
   forms
   notes

7. Do you participate in meetings?
   What are they about?
   Who are they with?

8. What do you do when there is a problem?
   tool/machine not working
   not enough materials

APPENDIX B

ESL FOR TQM

AS DEVELOPED FOR

BP/CHI

by Joan Apodaca

El Camino Community College

Fall, 1991

THE PROBLEMS WE ARE SEEKING TO ADDRESS:

1. TQM stresses the importance of input from all involved in any process, as they are likely to know better than anyone else where the snags exist in the process. Their participation is both written (in the form of submitting suggestions) and verbal (regular attendance at team meetings). Where the workforce is limited English speaking, their ability to participate in these ways is seriously hampered.

2. The quality of the finished product is impaired when workers at the assembly line level cannot read the Manufacturing Orders issued by the engineers. This results in lost time for rework when the disgruntled customer returns the part. It can also result in the loss of the customer.

3. The limited English speaking employee is at a disadvantage in reading such company communications as memos, bulletins, newsletters, etc.

4. The limited English speaking employee cannot write reports on malfunctions, nor can h/she leave informational notes to the next shift when necessary.

5. Since assembly line workers (and managers as well, but that is beyond the scope of our classes) are being asked to behave in new ways, they will need orientation to the following TQM concepts:

   A. Working as a team; awareness of group process
   B. A sense of personal stake in continuously improving quality
      1. The concept that improvement <u>is</u> a continuous process - Plan, Do, Check, Adjust as necessary, Do again.
   C. Viewing their jobs as part of a <u>process</u> which can be analyzed and improved
      1. Identifying internal suppliers and customers
   D. Confidence to express their views at team meetings; belief that their input matters
   E. A desire to learn and address the needs and concerns of the customers--both internal and external

PARTICIPANT CHARACTERISTICS

Approximately 15 students; one Vietnamese speaking, the rest Spanish speaking. At one end of the range, there is a woman who states she can neither speak nor write English. To some degree this appears to be a case of she can't because she's convinced she can't; she is not willing to attempt it. She reads it very badly but does claim to understand when spoken to. At the other end of the range is a man who went to Lennox High School as a youth. My sense is that both of these students are misplaced in our class. The rest of the class can all converse in English without too much evident difficulty, but their written English is extremely rudimentary. Their spelling is phonetic and their grammar is heavily influenced by the syntax of their native languages. Only one or two have had any previous formal English instruction, so, while they are eager to learn grammar, they do not yet have the basic terminology (such as "noun", "verb", etc.) to discuss grammar, and this must be covered. They volunteered for the class and are extremely well motivated. All are production or maintenance workers. Five had taken a previous class at the factory, "TQM VESL". The present class is considered more advanced because it incorporates writing.

METHODOLOGY

To the greatest degree possible, the day-to-day teaching should role model the skills needed to participate effectively in work team. Specifically, this means: (1) have a posted agenda and review it at the start of each day's class, soliciting participant input as to other items which should be placed on the agenda (2) the agenda should have anticipated times allotted to each item, and a timekeeper should be appointed to call attention to items running over (3) in the event of that happening, group should make the decision whether to re-allot time or table the item until a future class so that the rest of the agenda can be covered. (4) wherever possible, participants should do their work in groups or at least in pairs to promote cooperation rather than competition. The principles of Cooperative Learning are beautifully applicable to this type of class. Classes are scheduled for three hours, but with a ten minute break every hour, they are effectively only 2-1/2 hours long.

CURRICULUM

DAY ONE

I. Participants (including instructor) make "tent" name cards to place on table in front of them.

II. Ice-breaker - Participants interview one another for five minutes. One person only while the other talks. Then roles are reversed for five minutes. Next, this pair joins another pair and each person introduces the person they interviewed. After each introduction, the other three members of the group may ask questions. Allow at least 10 minutes for this. Finally, this group of four joins another group of four. In this group of eight, each member can introduce any <u>other</u> member on whom s/he has information. The other seven members may ask questions of the person being introduced after this

introduction is completed. Instructor "floats" from group to group, getting to know participants and answering questions about him/herself.

III. Instructor tells purpose of class: to give the communication skills necessary to fully participate in work team meetings, to do job well, and to advance within the company

IV. Explanation of team roles
   A. Facilitator - makes sure everyone participates, no one dominates. Keeps group on target and on time
   B. Clarifier - restates and checks accuracy of what each participant has said immediately after they have said it. (This is important in an ESL setting because it stresses the importance of careful listening. It slows the process down, and students like to skip it, but I feel it's important. It also gives each participant the sense that they've been heard and understood.)
   C. Scribe - takes notes on what is said, the group decisions arrived at
   D. Reporter - makes oral or written report on group decisions

V. Group Work - After each participant has filled out the survey portion of the Proposed Curriculum form individually, form groups of four to answer final three questions. The responses of all 4 people should appear on one sheet for a total of 12 responses.

VI. Individual Work - Sociogram of work communications (Instructor models each step on flipchart, while partipants work on each step at desks)
   A. Place self in middle of diagram.
   B. Write names of others with whom you communicate in the course of your work day surrounding self in center of diagram.
   C. Connect self to others with arrows indicating predominant direction of communication.
   D. On each arrow, write "oral" or "written" (or both) for mode of communication.
   E. Identify with lightning bolts the areas of troubled miscommunication.
   F. Turn this in to instructor.

VII. Collection of writing sample from participants so that instructor can analyze areas of necessary remediation. Ask participants to write on the following:
   A. How long they've been at the company
   B. What their job at the company is
   C. Previous work experience
   D. Hopes for course
   E. Other information you are willing to share about yourself

VIII. Customer Quality Evaluation - individually respond in writing to a questionnaire on day's class (see attached)--they are my customers.

DAY TWO (From this point on, grammar covered and spelling words tested come from analysis of student papers turned in).

I. Review of previous week's agenda. Questions? Review of current agenda. Additions?

II. Grammar lesson - ending punctuation
write out numbers 1-10 in formal writing (at this point, one of the participants asked that I teach how to right all the numbers; taught 1-100) Exercise to be done in pairs.

III. Assign 25 spelling words to be tested next class. Words taken from their writings.

IV. Pareto Chart of Communication Sociogram done in last week's class. Discussion of types of communication and areas of difficulty shown.

V. "Participating in Group Meetings" - participants take turns reading aloud, instructor assisting with pronunciation, giving general rules where applicable
   A. Using a survey of problems in the workplace that was done by this company, hold mock group meetings in which they will select the problem they wish to discuss as a means of practicing the "Key Actions" taught in "Participating in Group Meetings"
      1. List examples of the problem
      2. List suggested solutions
   B. Fill in page 7 of "Participating in Group Meetings" (Observation Form),Meeting, to evaluate how well new skills were put into practice.

VI. Customer Quality Evaluation form

DAY 3

I. Review of previous week's agenda. Questions? Review of current agenda. Additions?

II. Grammar lesson -simple present tense vs. simple past tense
   A. Teach what a verb is
   B. Review "-s" ending for 3rd person singular, present tense--and its variations
   C. Words that indicate present or past tense (such as "last night", "yesterday", etc.) Simple present tense used for habitual actions done regularly.
   D. Exercise to be done in pairs helping one another

III. At the request of a participant (received on the previous week's Customer Quality Evaluation form), explanation of dictionary pronunciation symbols for long and short vowels.

A. Exercise, to be done in pairs or small groups

IV. Spelling
A. Quiz on 25 words assigned last week (taken from their writings)
B. Copy 25 words to be quizzed next week (taken from their writings)

V. Paragraph writing information
A. Explanation of topic sentence
1. Tells what paragraph will be about
2. Is a generalization supported by facts in the paragraph
3. May express an opinion (to be supported by facts)
4. Can even be a question
B. Exercises on identifying topic sentences, to be done in groups of three.

V. Customer Quality Evaluation form

DAY 4

I. Review of previous week's agenda. Questions? Review of current agenda. Additions?

II. Grammar lesson (at the request of a participant, expressed on last week's Customer Quality Evaluation) - Regular present tense, third person singular
A. Exercise to be done in pairs or small groups

III. Spelling
A. Quiz on 25 words assigned last week (taken from their writings)
B. Copy 25 words to be quizzed next week (taken from their writings)

IV. Exercise on recognizing irrelevant sentences in a paragraph - to be done in small groups

V. Continue to read aloud "Getting Your Point Across", instructor assisting with pronunciation (using dictionary symbols for long and short vowels previously taught) and new vocabulary
A. Instructor points out the similarities in the techniques for getting your point across orally and in writing a well-organized paragraph (i.e., topic sentence, support, and concluding recommendation).

VI. Customer Quality Evaluation form

DAY FIVE

I. Review of previous week's agenda. Questions? Review of current agenda. Additions?

II. Grammar lesson - Plural Nouns
A. Teach what a noun is

B. Exercise to be done in pairs or small groups

III. Spelling
- A. Quiz on 25 words assigned last week (taken from their writings)
- B. Copy 25 words to be quizzed next week (taken from their writings)

IV. Topic and supporting sentences
- A. Small groups work on exercise on writing topic sentences

V. Finish reading "Getting Your Point Across"
- A. Fill in p. 6 in booklet (a suggestion you'd like to make to improve the work or workplace. Write what you will say to get the listener's attention, what your main point is, supporting details, and final summary or recommendation).

V. Customer Quality Evaluation

DAY SIX

I. Review of previous week's agenda. Questions? Review of current agenda. Additions?

II. Grammar lesson - Indefinite article

III. Spelling
- A. Quiz on 25 words assigned last week (taken from their writings)
- B. Copy 25 words to be quizzed next week (taken from their writings)

IV. "Getting Your Point Across"
- A. Oral presentations of suggestion for improving the workplace, p. 6. The first time the presentation is made, rest of group will merely listen intently for content. Then presentation will immediately be repeated, and this time the listeners are to raise their hands each time they hear a sentence which is fulfilling one of the Key Actions (i.e., getting the listener's attention, stating main point, providing support, and summarizing or recommending action). Therefore, the presentation will be subject to continual interruption. Instructor writes on flipchart the sentences the listeners identify as above, in outline form, one flipchart page per speaker, with the name of the speaker. These are to be saved for the next class.

V. Customer Quality Evaluation

DAY SEVEN

I. Review of previous week's agenda. Questions? Review of current agenda. Additions?

II. Grammar lesson - Definite Article
    A. Exercise to be done in pairs or small groups

III. Spelling
    A. Quiz on 25 words assigned last week (taken from their writings)
    B. Copy 25 words to be quizzed next week (taken from their writings)

IV. Teach transition words: *First of all, in addition, also, furthermore,* and *finally,* and "opinion words": *should, ought to, I believe, in my opinion, I suggest*

V. Writing of suggestion paragraph, first draft
    A. Explain concept of writing more than one draft
    B. Post flipchart pages from last week's oral presentations around room where each participant can see their own from where they are seated.
    C. Instructor models paragraph one sentence at a time on flipchart, students follow one sentence at a time from their outline on their flipchart pages posted around room:
        1. First sentence to get reader's attention
        2. Topic sentence
        3. Supporting evidence, each point being connected with one of the transition words
        4. Concluding sentence
    D. Students will probably need help with the following formatting rules:
        1. Indentation of first word of paragraph
        2. One sentence should be written immediately after the one before it (not as a list)
    E. Post flipchart page of grammar studied to date (present vs. past, indefinite article, definite article, writing out numbers 1 - 10, ending punctuation, plural nouns, "-s" ending on third person singular present tense). Make sure participants recall what each of these items is.
        1. Give time to proofread first draft in light of above grammar points
        2. Collect first draft

VI. Customer Quality Evaluation

DAY EIGHT

I. Review of previous week's agenda. Questions? Review of current agenda. Additions?

II. Grammar lesson - Verbal Adjectives
    A. Teach what an adjective is
    B. Exercise done in pairs or small groups

III. Spelling
   A. Quiz on 25 words assigned last week (Taken from their own writings.)
   B. Copy 13 words to be quizzed next week (List shorter this time because not all words were taken from their writings. Ten were taken from TQM vocabulary list taught in beginning class. Definitions of these words were discussed.)

IV. Return first draft with instructor's written comments on it. Allow time for writing of final draft.

V. "Listening to Understand Clearly" - individuals read aloud for pronunciation practice with instructor assisting in pronunciation and new vocabulary

VI. Customer Quality Evaluation

DAY NINE

I. Review of previous week's agenda. Questions? Review of current agenda. Additions?

II. Grammar lesson -Sentence Fragments
   A. Teach what a sentence is
   B. Exercise to be done in pairs or small groups

III. Spelling
   A. Quiz on 13 words assigned last week (Taken from their own writings and from TQM Vocabulary list
   B. Assign spelling for next week

IV. Continue oral reading of "Listening to Understand Clearly"
   A. pp. 6 and 7 done in front of class. As class observes the Key Actions being used, instructor will write on the flipchart what the participant actually did or said to show interest, show understanding, and ask for clarification.

V. Teach transitional words and phrases for describing a process: *first, second, next, then, after, that, finally, the first thing, the first step,* etc.

VII. Customer Quality Evaluation Form

DAY TEN

I. Review of previous week's agenda. Questions? Review of current agenda. Additions?

II. Grammar lesson - Comma With Transitional Words and Phrases (a combination of two participant requests--(1) to learn more about commas (2) to learn more transitional words). Done in pairs or groups.

III. Announce that an optional third draft of the suggestion paragraph can be done outside of class, otherwise the second draft will be put in participant's folder. (The result was that almost everyone rewrote their paragraph during class time when they'd finished other work.)

IV. Spelling quiz
    A. Copy list of 25 words for next week's quiz

V. Group discussion of chart "Tools of the Trade", followed by individuals filling out chart.

VI. "Listening to Understand Clearly", p. 7 - done as a class exercise. Two participants role play the listener and the speaker. The speaker describes his/her job while the listener uses the Key Actions taught in this unit to show interest, clarify, and express understanding. The first run through, the class merely listens and observes. The second time they raise their hands each time they observe the listener doing one of the Key Actions and what they report having observed is recorded on the flipchart by the instructor.

VII. Customer Quality Evaluation

DAY ELEVEN

I. Review of previous week's agenda. Questions? Review of current agenda. Additions?

II. Grammar lesson - Run-on Sentences
    A. Review definition of sentence
    B. Show how to correct run-ons with either a period or a coordinating conjunction and comma
    C. Written follow-up exercise to be done in pairs or groups

III. Spelling quiz
    A. Copy list of 25 words for next week's quiz. (There was a participant suggestion that everyone submit a list of the word's they'd missed on quizes throughout the course and that the last day's spelling quiz be made up of these, but the majority favored new words taken from their "Tools of the Trade" chart misspellings.)

IV. Reading: "The Evaluation: Communicating"
    A. Participants take turns reading aloud while instructor uses flipchart to give pronunciation assists and to explain unfamiliar vocabulary. This is at a lower reading level than the "Working" series, so there was very little unfamiliar vocabulary.

V. Customer Quality Evaluation

DAY TWELVE

I. Review of previous week's agenda. Questions? Review of current agenda. Additions?

II. Grammar lesson - Adjective vs. Adverb
   A. Definition of adjectives and adverbs and demonstration of their relation to nouns and verbs
   B. Point out characteristic "-ly" ending on many adverbs
   C. Teach *good* vs. *well*
   D. Written follow-up exercise to be done in pairs or groups

III. Spelling quiz

IV. Class discussion of internal and external customers and suppliers based on information given on Tools of the Trade description of their jobs.
   A. Paired discussion of handout on identifying internal customers and their needs
   B. Individuals fill out handout on needs of internal customers.

V. "Being A Team Player" (from "Working")
   A. Participants take turns reading aloud with pronunciation and vocabulary assists from instructor.

VI. Final party, to which supervisors of both participants and instructor have been invited. Certificates of completion given to participants.

VESL-7

TOTAL QUALITY MANAGEMENT FOR LIMITED ENGLISH PROFICIENT
Course Outline

OBJECTIVE: Employees with limited English proficiency will gain the conversational English skills they need to make contributions to quality improvement in their workplace while they learn the underlying content of quality principles and practices.

DESIRED OUTCOMES: Employees will develop the English language skills they need

- .to understand/appreciate Quality principles and concepts as they apply to their workplace
- .to develop and use problem-solving skills and understand how they will be used plant-wide
- .to understand and use the basic vocabulary of TQM/SPC
- .to become functional members of quality teams

ASSUMPTIONS: Learners are new to total quality concepts and have English language proficiency ranging from high beginning to intermediate levels as determined from an oral screening test.

CURRICULUM CONTENT: The following topics will be covered during the course:

- . Process/Continuous Process Improvement
- . Customer Focus
- . Teamwork/ Group Process Development/Meeting Skills
- . Conflict Resolution Strategies
- . Communication Techniques/Presentation Skills
- . Data Gathering/Display/Analysis
- . Competition vs. Cooperation
- . Prevention vs. Inspection
- . Management's Responsibilities

CLASS STRUCTURE: Classes are structured with small and large group activities emphasizing opportunities for learners to practice the principles which are being taught and the English language skills that go along with those principles. The instructor/coach models the behaviors and the language practiced in a quality atmosphere. Each class has a flexible structure which includes:

- Check in/ Review Day's Agenda
- Full Class Activities/ Exercises
- Introduction or continuation of a quality principle
- Teamwork activity -
  - practical application of principle in small team setting using roleplay, simulations, team discussions, etc. to encourage learners to practice the English skills they will need in actual plant teams
- Open discussion:Discussion of workplace and life issues and questions that will help clarify the quality principles through application to real life situations
- Check out

CLASS LENGTH: The length of the class will be determined based upon needs of individual employer as determined through a formal needs assessment

EVALUATION: The effectiveness of the course will be measured by a combination of standardized and informal measures determined to be suitable for the specified workplace/workforce.

SUPERVISOR CLIMATE SURVEY

1. This employee understands that he/she is contributing to making a larger part, i.e. an airplane.

1 2 3 4 5 N/A

2. This employee knows who else did work on the part they are currently working on.

1 2 3 4 5 N/A

3. This employee knows where the part goes after he/she finishes with it.

1 2 3 4 5 N/A

4. This employee is a socializer who likes working with others and sharing ideas.

1 2 3 4 5 N/A

5. This employee is friendly and active in meetings.

1 2 3 4 5 N/A

6. This employee participates in meetings by providing ideas.

1 2 3 4 5 N/A

7. When a problem arises with work, this employee attempts to solve it before he/she asks for assistance.

1 2 3 4 5 N/A

8. This employee has a sense of what lies ahead in the next 5,10,15 years for HITCO and the US as a whole as a result of worldwide competition.

1 2 3 4 5 N/A

9. This employee often assists others in the working environment.

1 2 3 4 5 N/A

10. This employee has a pride in the products he/she produces and understands that what he/she makes reflects who they are.

1 2 3 4 5 N/A

Quality Work Skills I

Vision: Have the premiere Quality curriculum for Limited English Proficient (LEP) workers.

Mission: Help LEP workers increase their participation and job satisfaction by creating a program which achieves language acquisition through the content of Quality principles and practices.

Assumptions:

Students are new to total quality concepts or have taken the basic Hitco course and have this course as a supplement. Their English language proficiency stretches from beginning to intermediate range.

The class runs from 40 to 45 hours.

Curriculum Content:

Curriculum content was chosen to fulfill, when appropriate, the purpose/desired outcomes of Hitco's basic track of total quality curriculum. They include:

* To understand/appreciate TQM principles and concepts
  To appreciate Deming principles
  To understand how problem-solving skills will be used plant-wide, in order to communicate
* To become a functional team member
* To understand basic vocabulary of TQM

(Starred outcomes are areas of concentration)

The following topics refer to the content in which means for language acquisition is used:

process
continuous process improvement
customer focus
teamwork
group process/development
meeting skills
conflict resolution strategies
communication techniques
company culture
management's responsibilities
constancy of purpose

Within each topic is a list of competencies/language functions for an instructional unit. An instructional unit may continue for several classes. Also, due to the nature of the content, competencies build on each other. They are introduced in one instructional unit and are carried over to subsequent units. Each instructional unit includes:

1. **Competency/Language Function:** The target competency/language function introduced is listed.

2. **Materials:** The materials below are used consistently. The instructor will also use new, supplementary materials, when found.

   Real People, Real Work. Lee Cheaney and Maury Cotter. S.B.A.K. Production, 1990.

   Working Glossary: Initial vocabulary/concepts compiled by Dawna Davis - additional vocabulary/concepts initiated each session by students.

   Adaptions drawn from:
   The Team Handbook. Peter Scholtes. Joiner Associates, Inc., 1988.
   TQM Basic Training (HITCO). Richard Hindshaw/El Camino College. 1991

   Teambuilding and other public access group activities shared with other Quality professionals.

3. **Vocabulary:** Content vocabulary/concept is listed. Class time is provided for students to add to vocabulary/concept list.

4. **Class structure:** Classes are structured with small and large group activities. Two major elements in the educational philosophy are cooperative and experiential learning. Students are asked to share information and help each other. After vocabulary words and concepts are introduced, students are asked to come up with their definition of the word or concept. Their definition is then added to their glossary. The instructor/coach models behaviors practiced in a quality atmosphere. Each class includes characteristics of team meetings (check-ins, ground rules, etc.). Except for the first two classes, each has a flexible structure as follows:

   Check in
   Review day's agenda
   Full class activity/exercise
   Introduction or continuation of a quality principle
   Teamwork activity --
      practical application of principle in small team setting
      roleplay, simulations, team discussion etc.
   Full class sharing and feedback of team activity results
   Open discussion: workplace/and or life issues, questions, use of language etc.
   Check out

Student Evaluation. Since TQM is a philosophy, a person usually needs tim to integrate the understanding and behaviors performed in a quality environment. Working in such an environment hastens learning since these behaviors can be practiced daily.

The class is frequently videotaped to monitor student progress. Pre and post tests are delivered.

Competencies/Language Functions: As stated above, quality behavior is measured in various ways. The listing below is a sampling of the behavior and the language functions related to them.

PROCESS/DEFINING AND IDENTIFYING

1. Defining concept of process
2. Identifying participants in a process
3. Identifying parts of a process
4. Identifying their role in a process
5. Defining concept of system
6. Identifying suppliers and customers in a process

CONTINUOUS IMPROVEMENT/EXPLAINING

1. Explaining idea of continuous improvement
2. Explaining how continuous improvement relates to work and to everyday life
3. Explaining the PDCA Cycle and how it is used

CUSTOMER FOCUS/IDENTIFYING AND EXPLAINING

1. Identifying supplier/customer relationships
2. Identifying their role as customer or supplier
3. Explaining the role of customer satisfaction in quality
4. Defining the diffrence between internal and external suppliers and customers

TEAMWORK/EXPRESSING UNDERSTANDING, MAKING SUGGESTIONS, EXPRESSING DESIRE, VOLUNTEERING

1. Expressing understanding of the importance of teamwork
2. Expressing understanding of benefits of cooperation (vs. competition
3. Making suggestions in a team setting
4. Expressing desire to be part of an improvement team
5. Expressing understanding of appropriate behavior of team members
6. Volunteering information during review sessions

GROUP PROCESS AND DEVELOPMENT/EXPRESSING UNDERSTANDING AND RELATING TEAM EXPERIENCES

1. Expressing understanding of stages of group development
2. Relating group stages to own team experiences
3. Expressing understanding for the need to do teambuilding activities

MEETING SKILLS/SUGGESTING, VOLUNTEERING, EXPRESSING, PARTICIPATING, ASKING REPORTING, INTRODUCING

1. Expressing vote for or against consensus
2. Volunteering information for brainstorming
3. Expressing opinions
4. Suggesting ideas or solutions
5. Participating in team/teambuilding activities
6. Volunteering for action items
7. Volunteering for roles within the meeting
8. Asking for back-up data
9. Reporting to team members
10. Introducing self at meetings
11. Participating in check-ins and check-outs
12. Volunteering ideas for ground rules

CONFLICT RESOLUTION STRATEGIES/EXPRESSING, REQUESTING, OFFERING, RESPONDING, GIVING INFORMATION

1. Requesting clarification
2. Expressing agreement and disagreement
3. Offering to listen
4. Responding to compromise
5. Expressing preference
6. Giving information through the feedback model
7. Responding to information from feedback

COMMUNICATION TECHNIQUES/SUGGESTING, ASKING, REPORTING, DESCRIBING, GREETING, INTRODUCING, RESPONDING, REQUESTING, INDICATING, ACKNOWLEDGING

1. Suggesting improvements to supervisor
2. Asking for information (of supervisor, team member)
3. Acknowledging understanding of information, concept
4. Acknowledging help, cooperation, teamwork, job well done
5. Introducing oneself, two co-workers
6. Introducing a new idea, concept or improvement
7. Greeting fellow workers
8. Giving information through the feedback model
9. Responding to information from feedback
10. Describing feelings, needs, emotions related to job tasks

COMPANY CULTURE/DESCRIBING, SUGGESTING, EXPRESSING

1. Describing aspects of company culture
2. Suggesting improvements
3. Expressing understanding that change can be slow and difficult

MANAGEMENT'S RESPONSIBILITIES/EXPRESSING, RESPONDING, ENCOURAGING

1. Expressing understanding of management's role in TQM implementation
2. Encouraging co-workers to support implementation

CONSTANCY OF PURPOSE/DESCRIBING, EXPRESSING, RECITING

1. Reciting HITCO's vision and mission
2. Describing how their job relates to the company's overall mission
3. Expressing understanding that fulfillment of the mission is everyone' job

BP Chemical Hitco
Outline - Math literacy class

Because of varying skill levels and interests, a fixed curriculum is neither possible nor desirable for an adult class. Rather, the participants should have an input into determining the skills they want to learn. In mathematics, these skills usually require a core of basic understandings. These basic topics have changed since the introduction of calculators and computers, focusing on problem solving skills rather than rote computation skills.

Each time this class is taught, it will be different. The teacher must remain flexible so that the learner's needs are addressed. The following topics are placed in a sequence which strives to be mathematically sound as well as psychologically appealing. A list of activities for which materials are available is listed under each topic. Of course, activities listed under an earlier topic can be used as review during a later class period.

Outline for 10 weeks: Text : Calculator Power

Week 1. Orientation to class: Use of calculators and computers. Numbers
- pre-test - ETS
- getting acquainted with groups
- questionnaire
- calculator familiarization - part 1 of text (pp 1 - 7) do 8 at home
- numbers - written in words and numerals - check writing
- decimal places p 48,49 (transparency - Manly)
- rounding to the nearest cent
- relative size of decimal numbers (Key to Decimals, book 1)
- measurement of lengths with ruler marked in tenths.
- Is item within specifications? (p 140, 150 Newton)

Week 2. text pp 10 - 27 (Addition and Subtraction - Operation Sense)
- Opener: Which is larger? comparing decimal numerals (p. 33, Key to Decimals, book 1)
- adding - extending your mental capabilities
  - by rounding
  - by grouping
- adding on the calculator - p10 - 15
- adding without carrying (handout - Manly)
- subtracting- opposite operation - p 16 - 17
  - using the calculator - order
- subtracting without borrowing (handout - Manly)
- which to use when - estimation or mental, paper and pencil, calculator, or computer?
  - mortgage refinance and checkbook examples. (p 20 - 27)
- word problems with the calculator. (p 18-19)
- Goat problem (Classroom Quickies)

Week 3. text pp 28 - 46 (Multiplication and Division - Operation Sense)

- Front end estimation with multiplication
- How to handle the zeros (handout- Manly)
- Multiplying with the calculator - p 28,29
- Multiply to find area - determine square footage for variety of home improvements
- Picturing multiplication - front end (handout - Manly)
- BP purchase order or p 36
- Hourly wages plus overtime rate (Question C - p. 67)
- BP pay stubs
- Compatible numbers - estimation with division
- dividing the European way (handout - Manly)
- Dividing with a calculator - p.30,31
- When to multiply and when to divide - p 32,33
- When does 45÷6 = 7? 8? 7.5?
- Remainders in division. p 42 - 45
- Comparing costs of checking accounts (bank brochure)
- comparing costs of child care and car purchase p 70,71

Week 4: Fractions and decimals: Understanding the concept

- Fractions as marked on a ruler
- Measuring length with a ruler marked in 32nds
- Comparing blueprint lengths (in 64ths) to specifications (in thousandths)
- Comparing fractions with decimals p 72, 73
- Common fraction and decimal equivalents (Manly)
- Which fraction is larger? (Manly- fraction table)
- Comparing sport records - batting averages, etc
- Fundamental Principal of fractions
- finding a fractional part of a number
- Estimating with fractions - compatible numbers

Week 5: Everday fractions

- Adding and subtracting fractional lengths
- Using decimals and/or fractions
- Fractions in recipes
- Using a calculator with fractions p 74 - 75
- Estimating with decimals and fractions p 66,67
- How many 3/4 are there in 10? More or less than 10?
- Dividing with fractions
- Changing units - sq ft to sq yds etc

Week 6: Rates, ratios and proportion

- Distance = rate x time applications
- Cost per unit applications
- Purchase order
- Fundamental principal of proportions
- BP application: Ruben's problem

Week 7: Using everyday percents
- 10%, 1%, 100% of a number (Key Curriculum Press)
- Using fractional equivalents to determine percents
- Estimating with percents
- Percents as proportions
- Using the calculator with percents
- Percents problems as equations using the percent circle p78 - 85

Week 8: Applications with percent:
- interest: credit card, on savings, on loans
- discounts:
- using fractional percents - DUI rate, interest rates
- sales tax
- income tax
- 20% cleaning solution
- per cent rejected - quality

Week 9: Data Analysis
- collecting data
- finding averages - mean, mode, median
- bar graphs to picture data
- range as a measure of dispersion
- reading BP graphs - line and bar

Week 10: Data Analysis
- probability and averages
- Circle graphs
- M & M's exercise
- Post Test
- Awarding of certificates.

BP CHEMICAL HITCO
MATH LITERACY PROJECT

TITLE OF COURSE: BASIC MATH FOR TODAY

OBJECTIVES: Provide problem-solving experiences through which the students will gain:

- confidence in using estimation and calculators to control the numbers in their lives.
- an understanding of the relationship between decimals and fractions.
- a level of comfort in evaluating formulas which are unfamiliar to them.
- ability to collect information, organize data into informational graphs and tables, and interpret findings.
- basic computer literacy so they are ready to use software packages.
- flexibility as problem solvers.

RESOURCES:

BP Forms
Banking forms
Income Tax forms
Measuring devices

BOOKS: The following books were analyzed to determine their suitability in meeting the objectives:

* (1) *Working With Numbers*, James T. Shea, Steck-Vaughn Company, Austin, TX

* (2) *Calculator Power*, Robert Mitchell, Contemporary Books, Chicago, IL

(3) *Number Sense: Decimal Addition and Subtraction*, Allen Suter, Contemporary Books, Chicago IL

(4) *Classroon Quickies*, Anita Harnadek, Midwest Publications

(5) *Key to Decimals*, Steven Rasmussen, Key Curriculum Press, Berkeley, CA

(6) *Real Numbers: Tables Graphs and Data Interpretation*, Allan D. Suter, Contemporary Books

(7) *Math for the Real World*, Dolores Byrne Kimball, New Readers Press, Syracuse, NY

(8) *Basic Occupational Mathematics*, David E. Newton, J. Weston Walch, Portland, Maine

(9) *The GED Problem Solver: Reasoning Skills to Pass the Test*, Myrna Manly, Contemporary Books, Chicago, IL

* Used as a text.

AVAILABLE SOFTWARE: The following packages have mathematical problem solving possibilities:

Mind Benders

In the Neighborhood

BASE

Algeblaster

Excel and/or *Lotus 123*

APPENDIX C

COURSES OFFERED SINCE THE BEGINNING:

1989 SUMMER

TECHNICAL MATHEMATICS - 1	(MATH FOR VOCATIONAL STUDENTS)
MACHINE TOOL TECHNOLOGY - 2	(BLUEPRINT READING)

1989 FALL

MACHINE TOOL TECHNOLOGY - 2	(BLUEPRINT READING)
MACHINE TOOL TECHNOLOGY - 2	(BLUEPRINT READING)
ENGLISH AS A SECOND LANGUAGE - 51B	(INTERMEDIATE LISTENING, SPEAKING AND PRONOUNCIATION)

1990 SPRING

TECHNICAL MATHEMATICS - 1	(MATH FOR VOCATIONAL STUDENTS)
ENGLISH AS A SECOND LANGUAGE - 52A	(INTRODUCTION TO READING & VOCABULARY BUILDING)

1990 SUMMER

ENGLISH AS A SECOND LANGUAGE 52A	(INTRODUCTION TO READING & VOCABULARY BUILDING)
MACHINE TOOL TECHNOLOGY - 40	(MACHINE SHOP CALCULATIONS)

1990 FALL

SUPERVISION - 15	(ELEMENTS OF SUPERVISION)
ENGLISH AS A SECOND LANGUAGE - 50X	(JOB SPECIFIC ESL)
TECHNICAL MATHEMATICS - 1	(MATH FOR VOCATIONAL STUDENTS)
COMPUTER INFORMATION SYSTEMS - 61	(INTRODUCTION TO MICROCOMPUTER AND SOFTWARE APPLICATIONS)

1991 SPRING

(CSP) VOCATIONAL ENGLISH AS A SECOND LANGUAGE FOR TQM

SUPERVISION - 15	(ELEMENTS OF SUPERVISION)
ENGLISH - 4	(ENGLISH GRAMMAR AND STRUCTURE)
(2) COMPUTER INFORMATION SYSTEMS - 61	(INTRO TO MICROCOMPUTER AND SOFTWARE APPLICATIONS)

COURSES OFFERED CONTINUED

1991 SUMMER

(CSP) COMMUNICATION ENGLISH SKILLS
(CSP) VOCATIONAL ENGLISH AS A SECOND LANGUAGE
(CSP) MATHEMATICS OF QUALITY

1991 FALL

COMPUTER INFORMATION SYSTEMS - 61 (INTRO TO MICROCOMPUTERS)
SUPERVISION - 15 (ELEMENTS OF SUPERVISION)
(CSP) ADVANCED ENGLISH AS A SECOND LANGUAGE

1992 SPRING

COMPUTER INFORMATION SYSTEMS - 67 (WORDPERFECT)
COMPUTER AIDED DRAFTING / DESIGN - 45 (GEOMETRICAL AND POSITIONAL TOLERANCING)
(CSP) MATHEMATICS FOR QUALITY
(CSP) ADVANCE ENGLISH AS A SECOND LANGUAGE

28 Total Classes offered.
The average participant takes two classes.
444 class slots have been successfully completed by 269 employees.
Range is 1:7 classes.

APPENDIX D

File

Presentation Window

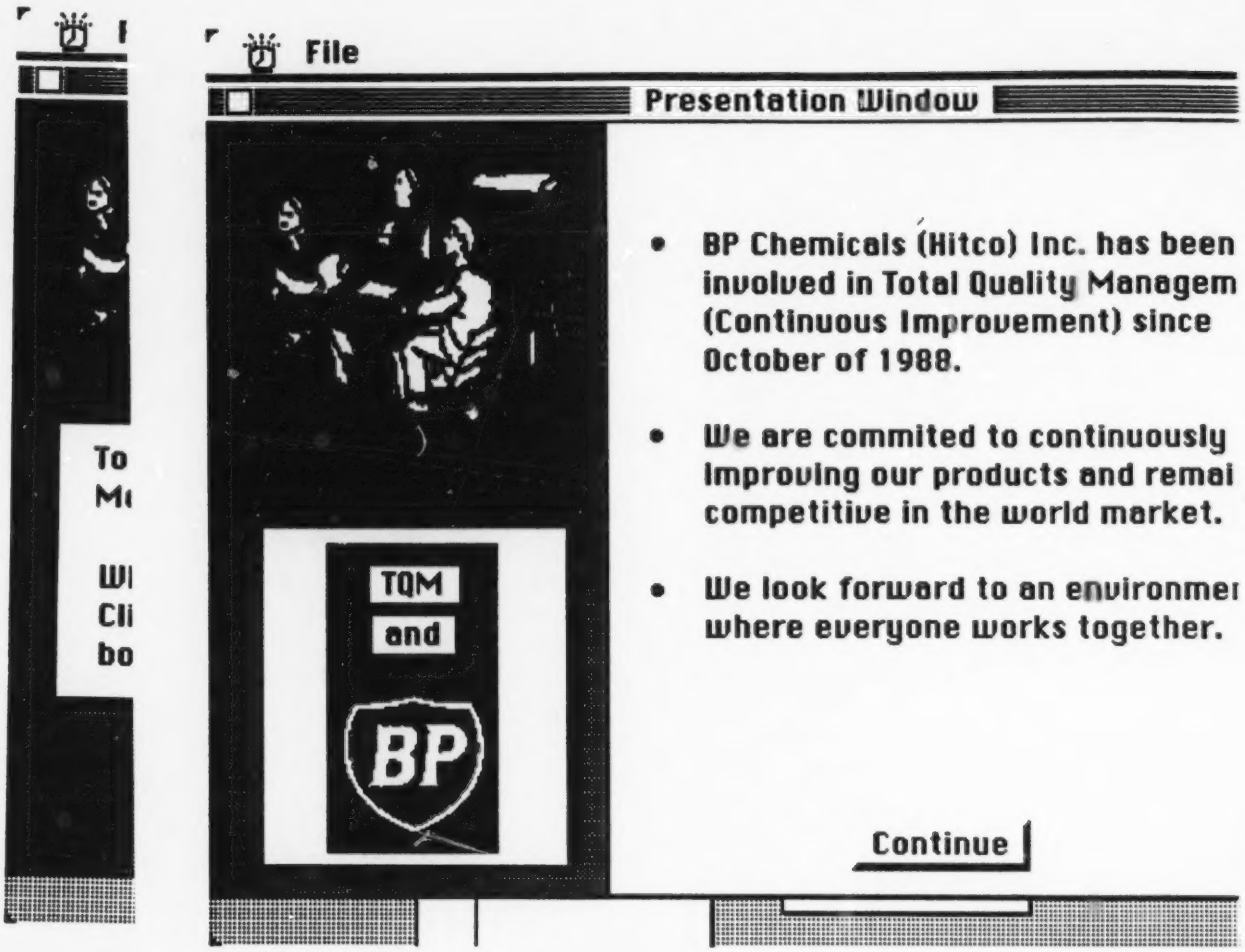
BP

BPCHI

MISSION STATEMENT:

To be the supplier of choice in the composites industry and to be recognized as such by our customers and employees.

Continue


File
Presentation Window
TQM
and
BP
• BP Chemicals (Hitco) Inc. has been involved in Total Quality Managem (Continuous Improvement) since October of 1988.
• We are commited to continuously improving our products and remai competitive in the world market.
• We look forward to an environmer where everyone works together.
Continue

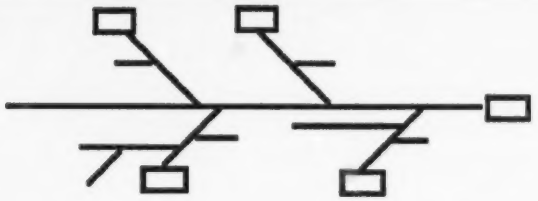
File ?

Presentation Window

WHAT IS PROCESS?

PROCESS is the combination of people, machine and equipment, raw materials, methods and environment that produces a given product or service.

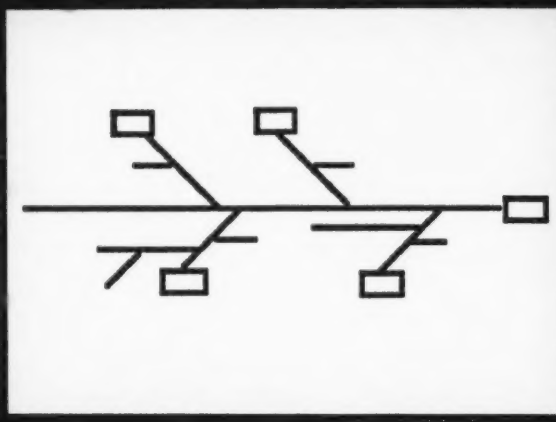
PROCESS can be understood by all team members by using a Cause and Effect Diagram (also called Ishikawa Diagram or Fishbone Diagram).



File Help Topics ?

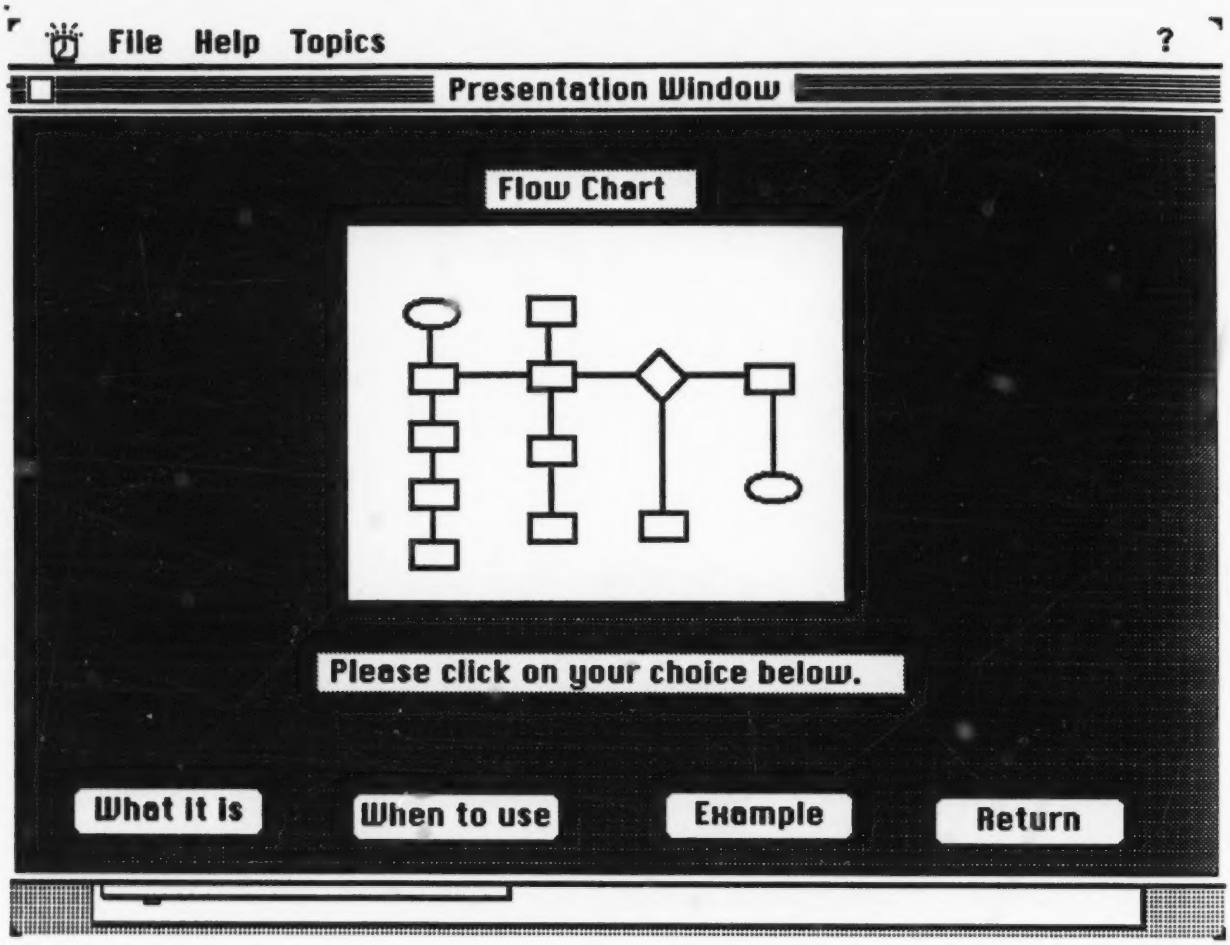
Presentation Window

Cause and Effect



Please click on your choice below.

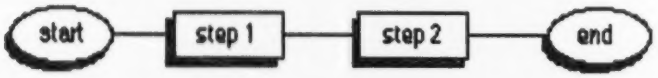
What it is | When to Use | Example | Return


File Help Topics
?
Presentation Window
Flow Chart
Please click on your choice below.
What it is
When to use
Example
Return

File Help Topics ?

Presentation Window

A flowchart shows the steps within a process. It gives information about what happens at each step and who is performing each task. Flow charts can be very simple or very detailed. Simple charts are easiest to work with.



File Help Topics ?

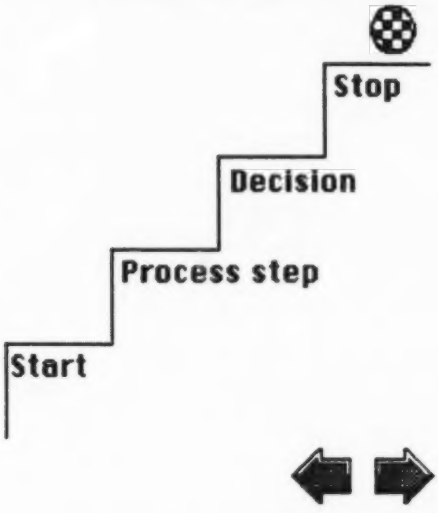
Presentation Window

A flowchart is like a map of a process. There is a beginning and an end. The different activities of the process, or steps, are shown in the middle. Different shapes are used for each: ovals, rectangles and diamonds.

File Help Topics ?

Presentation Window

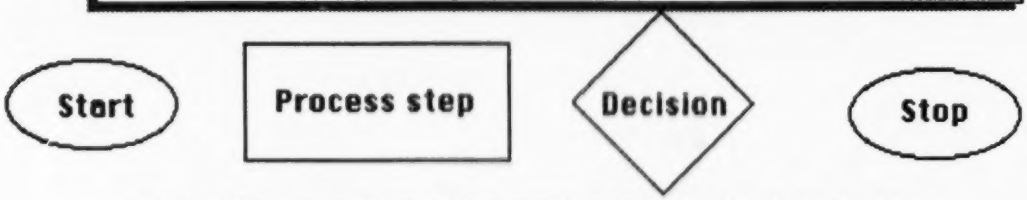
Flow charts are used when you want to know all the steps in a process.



File Help Topics ?

Presentation Window

Usually, a different symbol is used for each step, because at each step something different is happening.



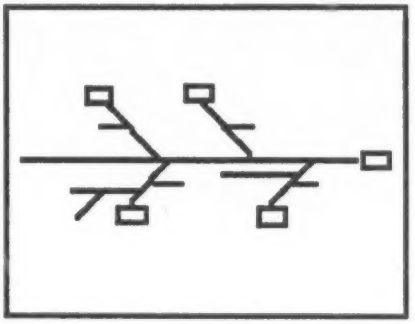
- We usually put an oval around start and stop.
- A rectangle indicates steps to be performed.
- A diamond usually indicates that, because of a decision, branching of the flow line will occur.

File Help Topics

Presentation Window

When to Use

The Cause and Effect Diagram can be used anytime a problem occurs and the causes of that problem need to be well understood and closely analyzed by everyone on the team.



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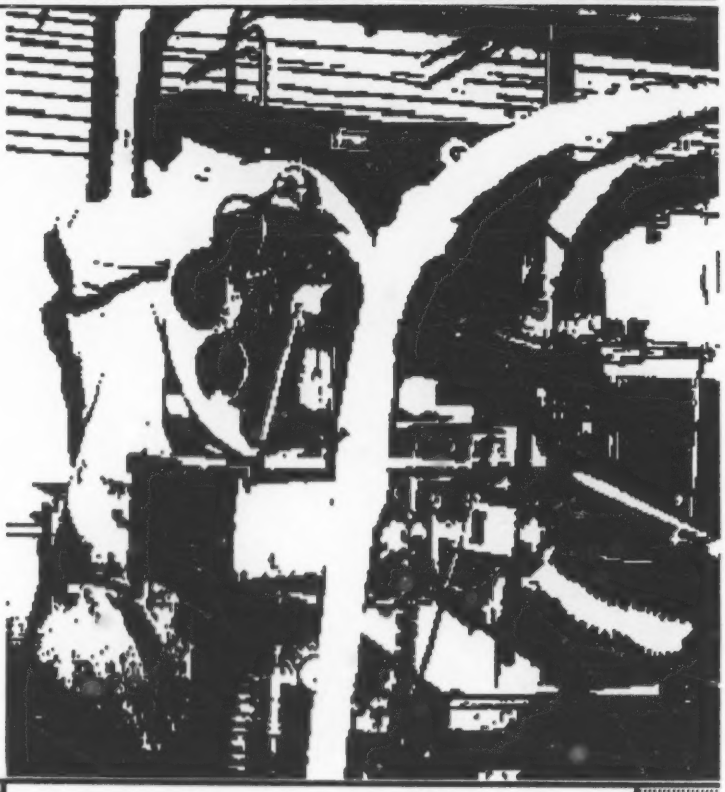
File Help Topics

Presentation Window

Problem scenario: from Pedro: what is this man doing? He receives faulty tools/parts from down the line somewhere, etc.



Click anywhere to continue.

Vic:

Can you tell what Ricardo is doing here? Please write me a brief explanation.

Thanks
Pedro